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ABSTRACT

The relationship between a fear of automation and teachers' attitudes toward a variety of instructional media is explored by comparing the attitude scores of teacher-education and computer science majors. Eighteen terms describing the instructional media were presented to both groups. Nine of the instructional devices were considered traditional, while the remaining nine were associated with automated instructional technology. The subjects, 78 undergraduate students, rated each term using six bipolar scales from the semantic differential. A repeated measures ANOVA lends further support to the hypothesis that a fear of automation is an important variable modifying teachers' attitudes toward instructional media. (Author)

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ATTITUDES TOWARD INSTRUCTIONAL MEDIA: A COMPARISON OF TEACHER EDUCATION AND COMPUTER SCIENCE MAJORS

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Abstract

This study explored the relationship between a fear of automation and teachers' attitudes toward a variety of instruction media by comparing the attitude scores of teacher-education and computer science majors. Eighteen terms describing the instructional media were presented to both groups. Nine of the instructional devices were considered traditional, while the remaining nine were associated with automated instructional technology. The subjects, 78 undergraduate students, rated each term using six bipolar scales from the Semantic Differential. A repeated measures ANOVA lends further support to the hypothesis that a fear of automation is an important variable modifying teachers' attitudes toward instructional media.

ATTITUDES TOWARD INSTRUCTIONAL MEDIA: A COMPARISON
OF TEACHER EDUCATION AND COMPUTER SCIENCE MAJORS

Prior research in the area of teachers' attitudes toward instructional media suggests that a fear of replacement by automated instructional devices may well be an important factor influencing the attitudes of teachers (Everson & Tobias, 1978; Tobias, 1963, 1966, 1968, 1969). Significant differences in attitudes toward essentially synonymous terms, e.g., programmed instruction and automated instruction have been reported and attributed to the differences in the degree to which the terms connoted automation.

Tobias (1963), for example, sampled teachers' attitudes toward three groups of terms describing instructional devices. Terms such as computer-assisted instruction, programmed instruction, workbook, flash-card, etc., were presented to the teachers. Although the terms used in this study were similar, they did differ in the degree to which each term connoted automation. The ratings reported by Tobias indicated that the least favorable attitudes were held toward the terms implying replacement of the teacher.

In a follow-up study (Tobias, 1966), an attempt was made to determine the degree to which teachers' attitudes were influenced by a general fear of automation or, rather, a more specific threat of replacement by particular instruction media. Three terms drawn from the area of audio-visual education were added to the groups of terms used in the previous study (see Tobias, 1963). The three groups of terms, i.e., audio-visual, automated, and programming groups,

each contained one term using the word tutor as a suffix or prefix (e.g., TV tutor, mechanized tutor, tutor text). Since these terms directly suggested replacement of the teachers' traditional function, it was expected that they would have the most negative reaction to them. This prediction was clearly confirmed by the data.

In a further study of teachers' attitudes by Tobias (1968), their ratings of sixteen (16) terms describing a variety of instructional media were factor analyzed. Three varimax-rotated factors emerged from this analysis. The resulting factor structure was interpreted in terms of whether a particular instructional device was used under the control of the teacher or in the absence of the teacher. Two of the emerging factors had high loadings on those instructional devices used in the absence of the teacher or in place of the teacher (e.g., automated instruction, TV tutor), while the other factor loaded highly on those devices used in the classroom by the teacher (e.g., workbook, exercise book, flash-card). This analysis also revealed that the latter factor received significantly more favorable ratings from the teachers than did either of the other two factors.

Continuing this line of inquiry, Tobias (1969) replicated the factor structure obtained earlier and computed the factor scores for all the subjects. These factor scores were correlated with the subjects' achievement on instructional material presented via a linear programmed format. As expected, the correlations between achievement from programmed instruction and the factor scores were significant; the correlation for factor I (i.e., automation/pro-

gramming) was r=.26, and for factor II (the traditional instructional devices) r= -.42. These correlations suggested that the subjects' underlying attitudes toward instructional media may account for a substantial portion of the achievement variance. Moreover, evidence was found to suggest that preferences for the more traditional forms of instructional media impact negatively upon achievement from programmed instruction, thus implying that the negative attitudes of the subjects interfered with their achievement from programmed learning materials. This finding has received additional support in more recent research which has suggested that a teacher's negative attitude towards programmed instruction may interfere with student achievement from such materials (King, 1975).

A much more recent research effort was aimed at testing more directly the hypothesis that a fear of automation negatively impacts teachers' attitudes toward instructional media (see Everson & Tobias, 1978). In this particular study it was expected that when terms describing instructional media were modified to indicate use as a replacement for the teacher, the attitudes of the teachers toward these terms would be less positive than if the terms were presented without such modification. Terms describing the same instructional devices, but which were modified to denote use of the device as an adjunct to the teacher, were expected to elicit the most positive attitudes since they clearly did not imply teacher replacement. Further, it was expected that the teachers' attitudes toward the more traditional instructional terms, such as flash-card, workbook, etc., would be less positive when these terms were coupled with a modifier denoting replacement of the teacher than terms denoting automation to begin with (e.g., teaching machine or automated instruction). The results of this study strongly confirmed the hypothesis

that a fear of automation, and more specifically the threat of replacement, is an important variable modifying teachers' attitudes toward terms describing instructional media.

If this threat of replacement by automated instructional devices negatively influences teachers' attitudes toward newly emerging instructional technologies, as the research just reviewed obviously suggests; and, if those negative attitudes interfere with student achievement from learning programs employing newly developed instructional media (King, 1975; Tobias, 1969), then the issue to be addressed by the designers and implementers of these new technologies is one of determining how best to modify those attitudes and thereby enhance student achievement.

One approach that has been suggested is the development of workshops designed to familiarize teachers with new instructional devices (Everson & Tobias, 1978). For the most part, those workshops that have been developed provide teachers with "hands-on" experience and serve to highlight the advantages of a particular instructional technology. The underlying assumption made by the workshops' designers, who more often than not are the manufacturers or designers of the device, is that this process of familiarization will attentuate the negative attitudes of the teachers by diminishing their fear of replacement and, in the long run, enhance student achievement.

The present study was designed to test this assumption by comparing the attitudes of both teachers and computer programmers toward a variety of terms describing instructional media. It was reasoned that teacher-education majors (i.e., teachers or aspiring teachers), like the teachers studied in prior

research, would have negative attitudes toward those instructional devices connoting automation, while computer science majors (computer programmers or computer hardware/software users) were expected to have less negative attitudes toward automated instructional media since they have a presumed familiarity with computer technology and its applications. Moreover, this study will also test the fear of automation hypothesis generated in earlier research which suggests that the teacher-education majors would have, in general, more negative attitudes toward the instructional media connoting automation or replacement than toward the more traditional instructional media.

More specifically, when both sets of terms describing instructional media (i.e., traditional vs automated) were compared for both groups (i.e., teacher-education majors vs computer science majors), the following main effects and interactions were anticipated:

(1) main effect for major - it was expected that the teacher-education group would have more positive attitudes toward all the terms, regardless of connotation, since this group is assumed to have more familiarity with instructional media

(2) main effect for terms - it was expected that there would be no main effect for terms since any such effect would be washed out by the interaction of major and terms

(3) interaction - an interaction was expected between terms and majors, i.e., the teacher-education majors were expected to elicit more positive attitudes toward the traditional instructional media, while the computer science majors were expected to have more positive attitudes toward the automated instructional media.

METHOD

Each subject was asked to rate eighteen (18) terms describing a variety of instructional media using six (6) bipolar scales drawn from the Semantic Differential (Osgood, Suci, & Tannenbaum, 1957). The scales were chosen for their high saturations on the evaluative factor. Each scale had a loading of .85 or above on the evaluative factor and negligible loadings on the others, suggesting that they were likely to elicit value judgments predominantly. The following bipolar scales were used: Good-Bad, Worthless-Valuable, Fair-Unfair, Meaningless-Meaningful, Wise-Foolish, and Reputable-Disreputable. The positive and negative poles were varied to avoid a positional bias. Moreover, the sequence in which the terms appeared was determined randomly. Each term appeared at the top of the page and the semantic differential scales appeared below it. Each booklet, too, was collated beginning with a different term. Thus, while the sequence was fixed, though randomly determined, the terms were presented in all possible orders from one to eighteen. Subjects were instructed to rate their attitudes toward all the terms according to their feelings about them, even if they did not recognize a particular term.

Subjects - the subject pool consisted of 78 students, 43 from the teacher-education discipline and 35 from the computer science discipline, drawn from undergraduate classes at City College, CUNY, during the Spring '78 semester.

Procedure - nine (9) of the eighteen (18) terms used to describe the instructional devices were considered traditional, while the remaining nine

(9) terms have come to be associated with the more contemporary instructional technologies, i.e., automation. The terms textbook (TB), flash card (FC), globe (GL), filmstrip (FS), blackboard (BB), exercise book (EB), overhead projector (OP), record player (RP), and individualized education (IE) were considered traditional instructional media. The automated terms used were: teaching machine (TM), mechanized tutor (MT), TV tutor (TVT), educational technology (ET), automated instruction (AI), programmed instruction (PI), computer-assisted instruction (CAI), computer-based instruction (CBI), and computer-managed instruction (CMI). Again, the subjects were instructed to rate their attitudes toward all the terms according to their feelings about them, even if they did not recognize a particular term.

RESULTS & DISCUSSION

The semantic differential scales were assigned scores from seven (7) for the positive pole of each scale, to one (1) for the negative pole. The scale scores for each term were then added, yielding a maximum score of 42 for each term, and a minimum score of six (6). Each of the six (6) bipolar scales tended to elicit highly uniform values for a given term, as was expected on the basis of their high saturations on the evaluative factor of the semantic differential. Figure 1 illustrates the mean attitude scores for each device for both groups.

Insert Figure 1

A 2x18 ANOVA with repeated measures on the second factor was performed and the results appear in table 1.

Insert Table 1

The results of the previously selected comparisons suggest, surprisingly, that the traditional instructional devices elicited more positive attitudes, regardless of the subjects' discipline, $t(16)=2.50$, $p<.05$. And as expected, the traditional instructional devices elicited more positive attitudes than the automated instructional devices for the teacher-education group, $t(16)=5.06$, $p<.001$. The data, however, do not support the hypothesis that computer science majors would have more positive attitudes toward automated instructional media than toward the traditional instructional devices. Although when the attitudes toward the automated instructional media were compared for both groups, the data tended to support the hypothesis that the computer science majors would have more favorable attitudes. Yet the difference between the means for the two groups did not achieve signifcance.

The results of this study lend further support to the hypothesis that a fear of automation is an important variable modifying teachers' attitudes toward terms describing instructional media. In general, the terms directly denoting automation and/or replacement of the teacher evoked more negative attitudes than the traditional instructional terms. And for the teacher-education group in particular, the differences in attitudes elicited by the two groups of terms was even more pronounced. Clearly, then, those terms

directly denoting automation evoked more negative attitudes than the more traditional instructional devices.

Lastly, the results presented herein strongly suggest that the instroduction of instructional devices denoting technology or automation appear to evoke strong feelings among prospective teachers fear regarding replacement by such equipment. Moreover, these data seem to suggest that these fears of automation and/or replacement on the part of teachers may be somewhat attenuated by exposure to and eventual familiarity with the educational applications of these highly technological and sometimes automated instructional media. In this regard, it behooves designers of instructional technologies to be circumspect in the selection of terms describing newly emerging instructional devices, and, further, this research clearly implies that attention be paid to teachers' attitudes in instructional media workshops and related activities. The failure to deal with these negative attitudes may have the unfortunate effect of the teachers' attitudes biasing student performance on newly developed instructional equipment in a negative direction.

Figure/Table Captions

Figure 1. Mean attitude scores for each instructional device.

Table 1. Analysis of Variance Results with Repeated Measures on the Second Factor.

Table 1. Analysis of Variance results with Repeated Measures on the second factor.

Source	df	MS	F	p
Major	1	84.65	0.229	$>.50$
Error within	75	370.11		
Terms	17	806.79	12.214	$<.001$
Major x Terms	17	225.30	3.411	$<.001$
Error between	1275	66.05		

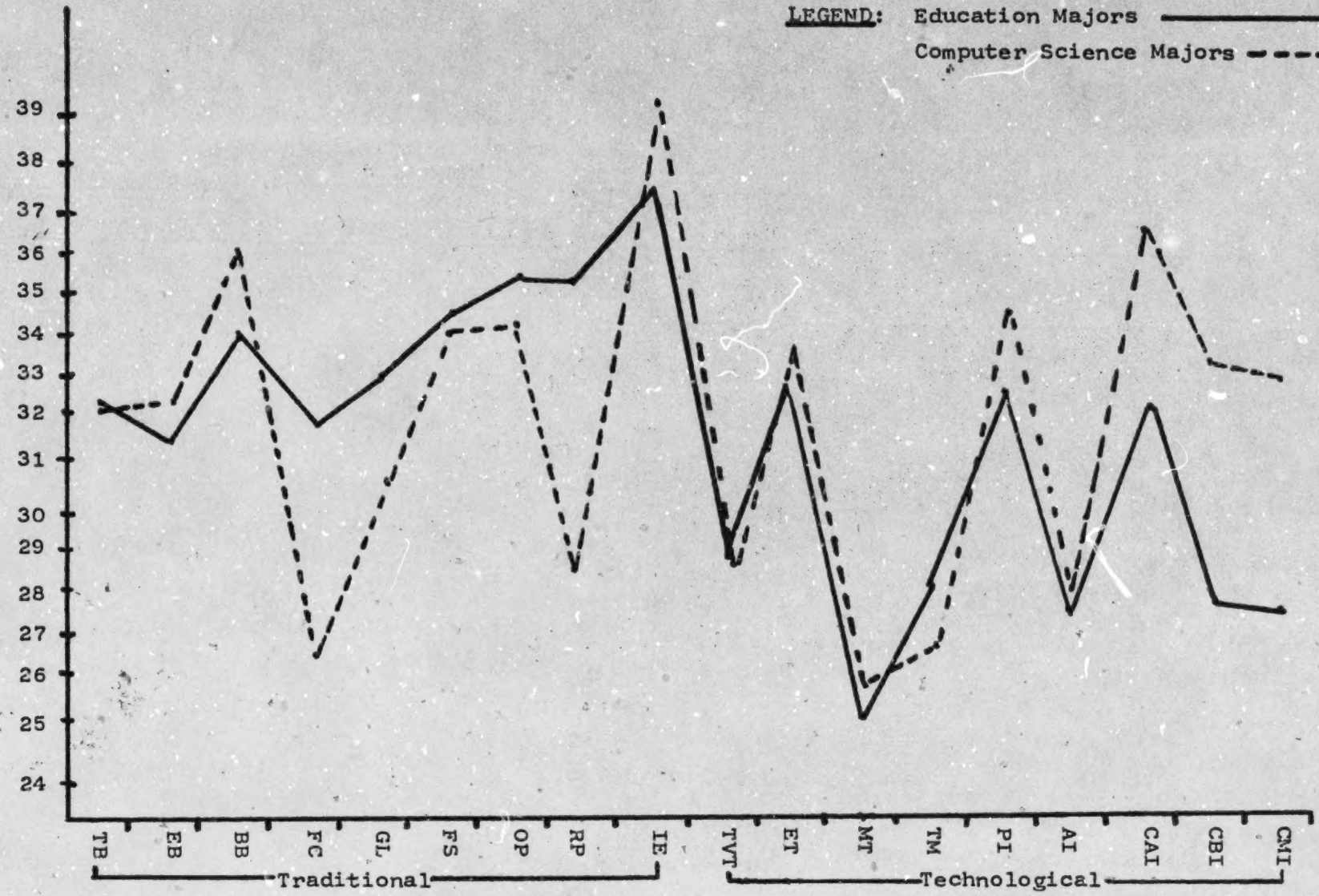

Figure 1. Mean attitude scores for each instructional device

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